Intergovernmental Oceanographic Commission

Workshop Report No. 154

IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA project)

Organized in cooperation with:
Sea Fisheries Research Institute of South Africa

Capetown, South Africa
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1. INTRODUCTION & OBJECTIVES

The IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region was held in Capetown, South Africa, November 30 to December 11, 1998. It was the second workshop on ocean data management in this region within the framework of the 'Ocean Data and Information Network for Eastern Africa' (ODINEA) project, funded by IOC, Sida and Flanders. The workshop's objectives were (i) to provide in-depth data management training; and (ii) to discuss progress made in the development of NODCs or DNAs during the past year, within the framework of the ODINEA project which is part of the IOC's IODE programme.

The Workshop was organized in cooperation with and kindly hosted by the Sea Fisheries Research Institute of South Africa, and was held in the excellent conference facilities of their seaside aquarium. We also wish to express our thanks to Dr Dave Pollock, Deputy Director: Environmental Research SFRI, and Dr Geoff Bailey, Assistant Director, SFRI for their assistance in the excellent arrangements. The Agenda for the workshop is contained in Annex I.

The 1997 Workshop (Mombasa, Kenya) was designed to provide training on the fundamentals of PC operations with standard computer utilities and Microsoft programs (e.g. Excel, Access, and QuickBasic). The training sessions during the 1998 Workshop were designed to explore the further use of these programs and other programs for the in-depth quality control and analysis of data as well as to explore new technologies for data dissemination. The constant stream of new software for marine data analysis and management provides a rich field for this work, but the IOC training team has attempted to avoid providing too many unrelated programs in favor of a semi-integrated package of programs that interact with related databases. Selected databases and programs that fit in this scheme are provided for each session on a "class CD-ROM" so that every detail of the training agenda is portable and capable of being duplicated.

The 1998 Workshop was also used as an occasion to review and possibly modify if necessary, the ODINEA workplan and budget for 1999 in order to ensure that the project responds to the (changing) needs of the newly established data centres in the IOCINCWIO region. More details are provided under 3.6

2. PARTICIPANTS

The workshop was attended by participants from Kenya, Mauritius, Mozambique, Seychelles, South Africa and Tanzania. The resource persons noted with appreciation that the recommendation for the Member States to send the same participants as for the 1997 Workshop was followed-up in nearly all cases. It was emphasized that continuity in this regard was a requirement for the success and long-term sustainability of the data centres and the project. Due to travel difficulties the participants from Madagascar were unable to attend. Nevertheless they were able to submit their activity report to the Workshop by email. Lectures were provided by invited resource persons from Australia, South Africa, the United States, Kenya and IOC. The list of participants and lecturers is provided in Annex II.

3. COURSE PROGRAMME

3.1 OPENING CEREMONY

Dr. Mayekiso, Chief Director of the Sea Fisheries Research Institute, Capetown, South Africa, officially opened the Training Course on Monday, November 30, 1998. His opening address is contained in Annex III.

On behalf of the IOC Executive Secretary (Dr Patricio Bernal), Mr. Peter Pissierssens, IOC/IODE Programme Specialist thanked Dr. Mayekiso, The Sea Fisheries Research Institute, and the government of South Africa for co-organizing and hosting this Workshop. He expressed the wish that this event would contribute to the further development of the IODE system and its implementation in the IOCINCWIO region. He reiterated the importance attached by the IOC to the IODE programme and

highlighted the important role of the National Oceanographic Data Centres in the IODE system. His statement is included in Annex III. Mr. Pissierssens concluded his remarks with a summary of Workshop goals, and an introduction of instructors Reed and Brown.

3.2 STATED GOALS FOR THE 1997-1998 INTERIM PERIOD

During the closing Session of the 1997 Workshop (December 1997) the participants were given the following assignments:

- *Develop catalogue of national marine data sources, describing the marine data sources related to your institution/country and/or your major projects. This includes the datafiles you already have, the data you know about and are trying to obtain, and even 'mystery data' that you have heard about but cannot locate.*

- *Develop outline and scope of an institutional marine database. Based on the catalogue above, and on the interest and projects of your colleagues in your home institutions, and on the research priorities of your country, write a database plan for a National or Institutional Marine database.*

- *Include in your plan a list of desirable data disciplines; be more specific than just 'biology' or 'chemistry'. For instance: marine pollution chemistry, marine meteorology, sediment trace metal chemistry, fish catch etc.*

- *List in the plan the types of data files you anticipate finding, such as: monitoring data, research data, climatologies, synoptic data, catalogues of metadata from other Systems (e.g. GLOSS and CMI output files)*

- *For each data discipline and type, indicate the format(s) you anticipate you will find or need (separate measurements, gridded data, graphs and tables, maps and charts, or a mixture.*

- *In the plan, create a logical structure of directories and sub-directories that you could use to store these data disciplines and types on your PC. Explain the logic behind this structure in a short 'white paper'. Include an estimate of total disk space needed to store the non-CD files you plan to have by end of 1998. Include a list of marine data CDs you will have by end of 1998*

- *In the plan, include a section on backing up your data collection. How do you back up, when do you back up, how do you keep the back-up copy safe, and how do you keep the records of the back-ups.*

- *After discussions with your supervisor, identify a standard regional map for a marine atlas for your data centre.*

The level of achievement and implementation of these assignments was analyzed during the 1998 Workshop and are reported under 3.3 and 3.4.

3.3 GENERAL OBSERVATIONS ON ACCOMPLISHMENTS IN THE 1997-1998 INTERIM PERIOD

All cooperating institutions received powerful microcomputers from the project in 1998. These will be used throughout the project. Furthermore the project gave financial support to provide most institutions with full internet access. All participating institutions can now communicate by email which was considered essential to ensure appropriate inter-sessional follow-up.

Whereas during the 1997 Workshop participants were grouped by 2 per PC, during the 1998 Workshop all participants had an individual PC at their disposal. Furthermore all PCs were networked and had full Internet access.

The resource persons were unanimous in their praise for the accomplishments of the 1997 workshop participants. Although the training work has tended to approach the general topic in terms of a "main pathway" towards database management, the participants have adapted the training to local goals and local limitations in outstanding ways. The overall cleverness of these approaches and the very promising early accomplishments lead us to predict very good near- and long-term growth in marine data resources on the IOCINCWIO region. Described below, the individual results include aggressive surveys of resources and imaginative uses of relational database schemes to use existing data in search engines. It is highly evident that the participants are also working tactfully within their governmental units to achieve critically needed consensus on the need for centralized cataloging – and in some cases centralized data management.

Overall, the presentations identified about 26 different types of data that have been found, with several different levels of availability apparent (Table 1, below). Due to the huge differences in these types, the training has always emphasized (and must continue to do so for practical reasons) generic types that are most common, such as hydrographic data.

Table 1. Data Types Identified by Session Participants During 1998 Surveys of Institutional Resources

	Kenya/ KMFRI	Mau/ U.M.	Moz/ IIP	Moz/ INAHINA	Sey/ SFA	SAfr/ SFRI	Tz/ IMS	SAfr/ Durban
BATHYMETRY	1	2	1	1	1	1	1	
MARINE BIOLOGY & ECOLOGY	2	2	1	4	1	1	2	1
CHARTS & MAPS	0	2	1	0	2	2	3	1
ECONOMIC GEOLOGY	2	3	4	4	3	4	4	
ENVIRONMENTAL PARAMETERS	1	2	1	3	2	1	3	1
EROSION & ENGINEERING	3	2	1	3	3	4	3	4
FISHERIES AND FISH BIOLOGY	1	2	1	4	0	1	1	1
GEOGRAPHIC INFORMATION SYSTEM	1	1	4	1	0	1	1	3
IMAGERY	0	1	4	4	2	1	0	
PROJECT/CRUISE REPORTS	1	4	1	4	1	1	3	3
MANGROVES	1	2	2	4	2	4	1	3
MARINE GEOLOGY	2	4	4	4	2	2	3	
METEOROLOGY	0	1	1	4	0	1	1	
MODEL OUTPUT	3	3	2	4	3	1	4	
OCEAN STATIONS/HYDROGRAPHY	2	4	1	2	4	1	3	2
PHYSICAL TIME SERIES	2	2	2	1	3	1	1	
PLANKTON/PRIMARY PRODUCTION	1	2	2	4	1	1	3	2
POLLUTANTS/CONTAMINATION	2	2	2	4	0	1	3	1
REEFS	2	2	2	4	0	3	2	
RIVERS	2	2	4	2	0	4	4	1
SEA LEVEL/TIDES	1	1	4	1	0	1	1	3
SHIPWRECKS&OBSTRUCTION DATA OR CHARTS	2		2	3	3	4	3	
SOCIAL/ECONOMIC/TOURISM	1	2	4	4	2	1	2	4
SOLAR/CLOUD COVER	0	1	4	4	4	2	3	4
TOXICOLOGY	2	2	4	4	0	1	3	2
WAVES	2	2	2	3	4	1	4	1

Key:

0 Data exists, but must be purchased

1 Data exists, and known to be available for archive/distribution

2 Data exists, but availability is unknown

3 Data believed to exist; no other information

4 No data

Because the current state of progress in the region is well beyond the earliest estimates made by the 1997 Workshop, the 1999 assignments were not formally made during the 1998 Workshop, but are being formulated during the first quarter of 1999. It is clear that the data centres are ready for undertaking a prototype regional database cataloging project, as well as early work on inter-institutional data sharing and co-management.

3.4 NATIONAL PRESENTATIONS

3.4.1 Kenya

The efforts at KMFRI are a highly structured cataloging of national/regional resources within the general information model originally presented at the 1997 Workshop. These categories (Contacts, Datasets, Documents, Organisations, Projects, and Software) are being used in an intensive survey of all known resources. The data tables continue to be maintained in Access 97. With regards to the management of actual datasets, KMFRI is still grappling with the main question most agencies face: Whether to attempt integration of multidisciplinary datasets, as opposed to cataloging of individually maintained datasets in different formats. Experience gathered by Mr Harrison Ong'anda (KeNODC) during his 1997 internship at the US NODC, will help to investigate the inherent problems in the data unification approach.

3.4.2 Madagascar

The Madagascar participants (although unable to attend in person) report that they received their new computer equipment, representing a considerable increase in data management capabilities at their institution. Due to the very limited time they have had with the equipment, they have concentrated mainly on formulating the structure of their national cataloging effort. Initial work will involve use of the KeNODC model, to be modified as needed.

3.4.3 Mauritius

In Mauritius, considerable effort has gone into a vigorous and comprehensive survey of all known marine-related research and management programs. Owing to the small size of this country, the participant has been able to contact nearly all such activities, and a general catalog is being organized. Basic decisions about the data management options are being considered.

3.4.4 Mozambique IIP

At the Instituto de Investigacao Pesqueira (Fisheries Research Institute) huge quantities of data in hard copy (based on many historical surveys and research projects) have been identified. Due to resource limitations, little has been done in the past to integrate (or even digitize) these data, but the general climate within the institution is very good for cooperation with the participant's local goals for cataloging and the eventual development of distribution mechanisms(s). A distributed model for storage and distribution is likely, as opposed to centralized mechanisms, due to the great diversity of the data. The IIP has partnered with INAHINA in the successful national data conference described below.

3.4.5 Mozambique INAHINA

The Instituto Nacional de Hidrografia e Navegação (National Institute for Hydrography and Navigation) has headed up one of the most ambitious and highly successful efforts in the region to organize a multi-institutional process for identifying, cataloging, and managing marine data. On May 29, 1998, INAHINA hosted a meeting of the eight principal agencies/institutions that hold marine data. At this meeting a consortium was forged which promises to be an exciting and well-conceived national center. The Mozambique NODC was established accordingly. Early cataloging of data types is underway. A distributed model for storage and distribution is likely, as opposed to centralized mechanisms, due to the great diversity of the data.

It is also notable that the INAHINA participant has provided incredibly well structured prototype data access engines (for existing digital marine data) based on Access forms and queries. The demonstrations given to the workshop provided a high mark for others in the region to emulate. In addition, because these prototype systems are so attractive, the Mozambican participants will be better able to attract the participation of additional institutions and agencies in the country. Even within the selected distributed data system model (in which it is typically difficult to work), the achievements of this country are outstanding.

3.4.6 Seychelles

In a classical data inventory, the participant has analyzed many historical records of cruises in the waters of the Seychelles, and identified enormous gaps in local holdings. These are primarily due to lack of submissions by the investigators from foreign laboratories, a common problem throughout the world. This work will take a while to complete since many data and reports of cruises or studies carried have not been submitted even though it is a requirement by law. The participant has taken up the matter with the Ministry of Foreign Affairs to trace these documents, studies and data.

Initial work on reformatting many of the available datasets into a single format is underway.

3.4.7 South Africa CSIR

This institution is involved in operational monitoring of coastal environmental quality, so it is not surprising that data is a main issue. They participate in the South African Data Collection Office's archiving program.

3.4.8 South Africa SFRI

This institution has a long history of well-supported coastal and deep surveys in many disciplines. The wealth of data available is cataloged into a system that reflects the various types of surveys and types of data. To date all effort has been concentrated on the entering of data available within the section and information that appear on the section's in-house oceanographic database. The research done by the section is mainly aimed at the long-term monitoring, of namely Sea Surface Temperatures, Currents, meteorological observations and water profiles (for temperature and nutrients). Oceanographic research, by means of research surveys on Sea Fisheries research vessels, is also done in association with the biological research on various species of fish that is harvested by the fishing industry. The Access data catalogue is structured in such a way that each component monitored has its own form used to enter the relevant data.

3.4.9 Tanzania

Development of an institutional system here has been severely hampered by poor communications with the Internet. The main accomplishment has been the recent establishment of a National Oceanographic Data Center at the Institute for Marine Sciences. Principal activity now centers on surveying all available sources for information about datasets.

3.5 LECTURES & PRACTICALS

The course of training has been structured to reflect a seminal review of the marine data and information management process, authored by instructors Brown and Pissierssens. The outline, tentatively named **A Toolkit of Information Management Modules for ICAM and Coastal Oceanography Programs,** has been published as part of the **ODINEA CD-ROM (1997)**

TRAINING SESSIONS SUMMARY

3.5.1 Database Manipulation and Analysis

The training work in the first week was based on the new CD-ROM produced for this session by Dr. Brown. The outline of the CD is given in Annex IV. All participants received a copy of the CD-ROM for use during the Workshop and to take home for further self-study. This is a revised and updated version of some of the materials presented in the 1997 Workshop CD, but considerably more attention has been placed on integration of programs and databases. General information about overall program management has been eliminated, as it was well covered previously. The principal new element is an overhaul of OceanPC to a new version, named "OceanPC 2000." This new system includes an entirely new visual data browser, Ocean Data View, independently developed by Dr. Reiner Schlitzer in Germany. Additionally, the new CD contains a much larger selection of satellite data information, and it was developed to be accompanied by a set of CD-ROMs of satellite data contributed by the US National Aeronautics and Space Administration (NASA) from their Physical Oceanography Distributed Active Archive (PO-DAAC) center in California. Finally, the new World Ocean Database 98 was also distributed during the first week of the Workshop, as it is now integrated into 'OceanPC 2000' through several routes, including direct import into Ocean Data View.

Day 1. Initial "housekeeping" information and welcome ceremony. Presentation of accomplishments by individual institutions, in response to the 1998 assignments set. This is summarized in Sections 3.3 and 3.4, above.

Day 2. Review of database types within the OceanPC scheme (i.e. spreadsheets/flat files, hierarchical files with multiple record formats, and relational databases).

Practical Work - Exercises with the OceanPC 2000 software. The interconnections between the program elements in the new "OceanPC 2000" software system were described, and the participants performed a number of conversion among and between the various formats.

Day 3. The new World Ocean Database 1998 (WOD98) described and distributed, and the participants extracted data from it to the Ocean Data View Program (ODV). ODV was the subject of intensive discussions and examples.

Practical Work - An example file in ICES standard profile format was converted via OceanPC 2000 routines to the Ocean Data View format. Along with other data from the WOD98, these data were used in data quality control exercises with ODV.

Day 4. Introduction to binary data files. Previous work in this program has focused on ASCII data, but recent developments in access to large quantities of binary satellite and other earth science data require that the students become familiar with format and used of binary data. Following a formal lecture in binary format types, the students were acquainted with the fundamental questions needed to manipulate such data (i.e. the logical structure and the geophysical registration scheme).

Practical Work - Following the introduction to useful binary data manipulation and analysis programs (NASAView, HDF Data Browser, 3Dem60, ImDisp) the students visualized some earth topography and bathymetry data from the class CD-ROM.

Day 5. Introduction to satellite data types and some useful data archives. The students were introduced to the satellite data contained on several NASA CDs provided by the instructor. General problems in using such data were discussed, primarily the great number of formats.

Practical Work – The students examined all the satellite data CDs by means of the various binary data browsers, attempting to inventory the data available for an arbitrarily selected time period. This exercise brought out the great differences in logical formats used, and in the structure of the various archives.

3.5.2 Databases, Metadata, Web Publishing, and Network Tools

Day 6. Review of database concepts and MS Access (Greg Reed)

This session reviewed database management systems. Relational database management systems (RDBMS), object oriented database management systems (OODBMS) and object relational database management systems (ORDBMS) were defined. The advantages and disadvantages of these systems were discussed. The steps in designing a database were also outlined.

Practical work – Design and implementation of a MS Access database

Practical exercise covered the design and development of a database to store cruise report information. Topics included creating a new database, creating tables, creating relationships between tables, editing and deleting relationships, creating queries, basic SQL queries, creating forms and sub-forms and importing data from other applications.

Day 7. The use of metadata in marine data management (Greg Reed)

This session described the importance of metadata for the management of marine data. Metadata is "data about data" and includes characteristics about the data such as the content, accuracy and the source. Metadata provides the mechanism to describe data in a consistent form that will allow users to gain a uniform understanding of the content and fitness for use of datasets. The effective management of marine data involves knowing what data are available, the use to which the data can be applied, its quality and its physical location. It also involves providing a simple means to find and access those datasets and this can be achieved through a metadata directory. The key aim of a metadata directory is to enable users to determine the relevance and quality of a dataset for a specific purpose without requiring the dataset itself to be acquired and examined.

Practical work – MEDI Pilot Project

The MEDI Pilot Project is a data directory of marine and coastal datasets. It is used to record metadata for marine datasets. This software was demonstrated and instruction given on correct ways of entering metadata. Participants entered metadata into the data directory and translated data from their own data directories into the MEDI Pilot Project Data Directory.

Day 8. - Introduction to HTML (Peter Pissierssens)

A tutorial on getting started with HTML (HyperText Markup Language) and how to design a web page. References were provided to on-line HTML publications. Information was also provided on various HTML editors and website management packages. Some freeware and shareware HTML editors were included in the take-home CD-ROM.

- Data publishing on the Internet (Greg Reed & Peter Pissierssens)

This session discussed the use of the Internet to 'serve' oceanographic data and information. The internet offers access to data and software through a variety of services and tools including electronic mail (e-mail), remote login (telnet), file transfer (ftp), news and World Wide Web (WWW). Each of these services was discussed in detail. A comprehensive glossary of Internet terminology was also provided. An introduction was given to static and dynamic database serving using Access 97 and its ASP technology.

Practical work – Install Personal Web Server and publish data on the Internet (Greg Reed & Peter Pissierssens)

Using the Cruise Report database created in the previous exercise, students created a static web document and viewed with the web browser. The installation procedure for the Personal Web Server software was demonstrated. A dynamic web document was then created from the same database and viewed on the Internet. Although most participants were able to implement the task given it was clearly shown that MS Access 97 is not the easiest solution to serve databases dynamically on the WWW.

Day 9. Internet for oceanographic information and data exchange (Greg Reed)

This session demonstrated on-line access to oceanographic datasets on the WWW, how to visualise these datasets and download data.

Practical Work. - Access to on-line marine databases on the Internet

A demonstration of on-line access to oceanographic datasets and ways to visualise these datasets and download data. A number of different sites were visited including:

- Access to climate data - *http://ferret.wrc.noaa.gov/fbin/climate_server*
- ETOPO5 gridded bathymetry - *http://www.ngdc.noaa.gov/mgg/global/seltopo.html*
- Tropical Atmosphere Ocean (TAO) Array real-time data - *http://www.pmel.noaa.gov/toga-tao/datdis.html*
- SeaWiFS ocean colour image library - *http://seawifs.gsfc.nasa.gov/SEAWIFS.html*
- Ocean products on-line at AODC - *http://www.AODC.gov.au/*

Day 10. Overview of data management at an NODC (Greg Reed)

This presentation discussed the functions and responsibilities of a national oceanographic data centre. The activities of the Australian Oceanographic Data Centre (AODC) were outlined. The data management functions of the AODC were detailed and these include:

- Data Collection and Acquisition
- Data Monitoring - Metadata and Data Inventory
- Data Quality Control - Formats, Translators, Converters
- Databases - Archiving, Storage, Retrieval, Visualisation
- Data Exchange - Standard Formats, Transfer Protocols
- Data Distribution - Products, Media

3.6 ODINEA PROJECT WORKPLAN DISCUSSIONS

The last days of the Workshop were used to discuss the ODINEA Workplan (1999) with a view to optimize the workplan to cater for the needs of the newly established data centres. In order to ensure the best possible conditions to build the data centres the ODINEA project includes substantial support for infrastructure and operational expenses for each data centre. The participants were requested to prepare a draft 1999-2000 workplan for their data centre. This was followed by discussions, led by Mr Mika Odido.

The main objective of the 1999 workplan will be to develop a national meta-database of national (and possibly external) ocean data holdings using the MEDI metadatabase system developed for IODE by the AODC in 1997/98 and extensively covered in the workshop. The specific activities will include:

- National data and metadata mining exercise
- Population of a national metadata base (using the MEDI system)

Then, as from 2000:

- Development of a national data archive
- Development of a national data management facility (including dataset collection from national research facilities, data quality control, data archiving, data product and services development)

Draft Workplans were drafted for Kenya, Mauritius, Mozambique, Seychelles and Tanzania. It was noted that South Africa is a special case: as South Africa already has an operational NODC it was decided that the role of SFRI within ODINEA needs to be discussed first. It is expected that a sub-datacentre will be established as SFRI deals with a wider range of data types (SADCO deals mainly with physical oceanograhy data).

It was stressed that the workplan should clearly reflect a substantial in-kind or financial contribution by the requesting institution as this will be the only guarantee for long-term sustainability of the data centre.

The data products prepared during 1999 will be transmitted to the regional coordinator for checking and compilation into a regional metadatabse. In this regard, the participants unanimously elected Mr Mika Odido (currently also regional GLOSS coordinator) to be the regional coordinator for ODINEA. It was decided not to draft a detailed task list for the coordinator as this will take shape during the next few months and will develop on a need-to basis.

Finally, it was noted that additional funds might be required (local or external) for the 'operational expenses' item covering national meta-data and data retrieval and archival projects (as part of the national workplans). It was also recommended to set up a dedicated listserv odinea@unesco.org for easy sharing of news on the project.

4. WORKSHOP FOLLOW-UP

It has been shown repeatedly that organization of workshops and training courses without guided follow-up does not lead to long-term sustainable projects. It is for this reason that a regional coordinator was identified (see above). Furthermore an ODINEA task team composed of the project resource persons Dr Murray Brown, Mr Greg Reed, Mr Peter Pissierssens and Mr Mika Odido has been established. They will ensure the follow-up of the 1999 Workplan and moderate the ODINEA listserv. It was also agreed that an ODINEA website will be set up (http://ioc.unesco.org/odinafrica)

5. RECOMMENDATIONS

It was agreed that the next Workshop will be held in November/December 1999. The participant from Mauritius made a tentative offer to host the Session, pending approval by the Mauritius authorities.

ANNEX I

AGENDA/COURSE PROGRAM

Date	Responsible Person	Content		Notes
Monday, November 30. Morning	Mr. Pissierssens	Opening ceremony. Welcome address. Housekeeping information for the attendants.		
Monday, November 30. Afternoon	Dr. Brown	PROGRESS REPORTS:		The students have received a long-term assignment to begin preparation of marine data collections specific to their country or agency. Each institution should prepare a short written report on their progress to date (3-5 typed pages) to be presented to the class and discussed by the group. Each institution will have 30 minutes to make a spoken presentation (with overheads or other visual aids), followed by comments and questions from the floor. The papers may be in French or English, and must be presented as hardcopy and on a diskette (WordPerfect or Microsoft Word).
		1:00 pm	Kenya-KMFRI	
		2:00 pm	Madagascar-IHSM	
		3:00 pm	Mauritius - University of Mauritius	
		4:00 pm	Mozambique - Inst. Invest. Pesqueira	
Tuesday, December 1. Morning	Dr. Brown	PROGRESS REPORTS:		See above.
		8:00 am	Mozambique - INAHINA	
		9:00 am	Seychelles Fishing Authority	
		10:00 am	South Africa - Sea Fisheries Research Institute	
		11:00 am	Zanzibar - Univ. of Dar Es Salaam	
Tuesday, December 1. Afternoon	Dr. Brown	Introduction to the "CAPETOWN CD"		The materials already presented in the 1997 "Mombasa CD" have been updated (new versions of programs, expanded datasets) in a supplemental CD that will be briefly introduced.
		OceanPC 2000 - Overview and Introduction		First presentation of the new version of the IODE standard software package. Use of the hypertext interface to run the various programs.
		OceanPC 2000 - Ocean Data View (ODV) Software		First presentation of the new ocean data browser, using test files in the installation package.
Wednesday, December 2, Morning	Dr. Martin Grundlingh	Presentation on SADCO and SADCO database		
Wednesday, December 2. Afternoon	Dr. Brown	OceanPC 2000 - World Ocean Database 98 (WOD98)		First presentation of the new world atlas (replacing WOA94) used in the Mombasa workshop.
		OceanPC 2000 - Creating a Regional Ocean Data Atlas with ODV and WOD98		Extraction and use of relevant files from WOD98 to populate a "collection" for the IOCINCWIO area(s).
		OceanPC 2000 - Spreadsheet Data Entry		Use of sample data (hardcopy) with a simple Excel spreadsheet data entry procedure.

		OceanPC 2000 - Adding Local Data to the Regional Atlas	Use of new routines in OceanPC to convert spreadsheet data directly to ICE format or to ODV format. Import of spreadsheet data to the ODV "collection".
		OceanPC 2000 - Preparing Local Data for Submittal to IODE	Use of the SD2 export routine in OceanPC 2000 to make a file that can be submitted directly to a (n) RNODC or WODC.
Thursday, December 3. Morning	Dr. Brown	OceanPC 2000 - Roles of Excel and Access	Special exercise to use Excel for spreadsheet data entry followed by importing the data into Access. Special routines in Access to parse simple tables into multiple-table, relational structures.
		OceanPC 2000 - Creating Additional Functions in Access	Analyses, data manipulations, and data conversion that cannot be accomplished in the formal OceanPC 200 structure can be performed easily in Access 97. Examples of these activities, using spreadsheet data imported from Excel and converted to relational structure.
Thursday, December 3. Afternoon	Dr. Brown	NEW SOFTWARE ON THE "CAPETOWN CD": ITIS - Integrated Taxonomic Information System OceanPar OPCPlot 8.0	Introduction to new programs or updates. In some cases, the exercises are designed to solve problems identified in the Mombasa workshop. Demonstration of the new system, using marine mammal data Quick marine data calculations Revised global plotting software, with improved graphic screen capture
Friday, December 4. Morning	Dr. Brown	NEW SOFTWARE ON THE "CAPETOWN CD": CSV to Surfer VMAP WinZip32 WOD-ICES	See above. Used to prepare OceanPC 2000 data for gridding with Surfer 6.0 (found on Data Conversion Menu) Simple mapping program Used to create archives of large files. Can handle TAR and GZ files. Converts directly from WOD98 to ICES format, for use in OceanPC 2000
Friday, December 4. Afternoon	Dr. Brown	NEW DATA & DOCUMENTS ON THE "CAPETOWN CD" Data Formats: GF3, P3, SD2, Code Tables, GETADE Long-Time Series Data for the Indian Ocean WOD98 Files for the Indian Ocean	Small collection of documentation for some important formats Selected data from NODC CD-ROM 20 Selected data from the new CD-ROM

		Satellite data sources and data sampler	Overview of data available in new NASA CD's; discussion of formats; viewers and data conversion software
Saturday, December 5. Morning	Dr. Brown	Data Extraction from Satellite Image CD's	Continued exercises in how to extract and use satellite image data from NASA. Use of HDF viewers, or extraction of ASCII or binary files for use in other programs is explained. Use of special new program to convert "Z data" to "XYZ data" (for use in Surfer 6.0) is demonstrated.
Monday, December 7	Mr. Reed	GENERAL OVERVIEW OF DATABASE CONCEPTS	Review of DBMS - relational and commercial systems Review of Access Design and implement a cruise report system (tables, forms, reports, queries, data entry)
Tuesday, December 8	Mr. Reed	USE OF METADATA IN MARINE DATA MANAGEMENT	Overview of metadata. Standards in widespread use. The "Blue Pages" as a practical example. Minimal content; data entry procedures; search strategies; reports production; and import/export functions.
Wednesday, December 9	Mr. Reed	DATA PUBLISHING OVER AREA NETWORKS AND OVER THE WORLD WIDE WEB	Publishing digital data: Media options, on-line methods. Overview of internet services: Client/server architecture; ftp; telnet; email; html basics. Practical session: Create a web document from an MS Word document. Check and correct formatting with browser editor. Create a static web document from MS Access database. Create a dynamic document from the same source. Install a web server to enable Web publishing.
Thursday, December 10 Morning	Mr. Reed	ONLINE ACCESS TO OCEANOGRAPHIC DATA	Practical methods in using the Internet to visit different sites where oceanographic data can be selected, visualized, and downloaded.
Thursday, December 10 Afternoon	Mr Pissierssens & all participants	ODINEA project implementation planning	Overview of the ODINEA project and discussion on 1999-2000 activities
Friday, December 11	Mr. Reed	ADVANCES IN MARINE DATA MANAGEMENT	Overview of the International Symposium on Information Technology (Goa, India, October 1998).

ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

WELCOMING ADDRESSES

1. DR. MAYEKISO, CHIEF DIRECTOR SFRI

ODINEA, which stands for Oceanographic Data and Information Exchange network for East Africa, is a project funded by the Intergovernmental Oceanographic Commission of UNESCO. The programme aims to train oceanographers from 7 countries bordering the west Indian Ocean in the latest techniques associated with data management and it also encourages a regional data and information network stretching from Kenya and Seychelles in the north, South Africa in the south and Mauritius and Madagascar in the east. It is hoped that by enhancing the capability to interpret oceanographic data in the region, the best advice can be provided on actions to governments of the region. In South Africa we already have programmes such as BENEFIT which encourages collaboration with our Benguela Current neighbours to the north-west of us and it is most opportune that we now have ODINEA creating a valuable link with our African neighbours to the north-east of us. South Africa, being at the confluence of the Indian and Atlantic Oceans, is heavily influenced by the Indian Ocean both in terms of its climate and certain marine resources and it is appropriate that this workshop is hosted here in Cape Town.

I understand that you held your first meeting in Mombassa last year and from reports from a member of my staff who took part, I am lead to believe that it was most successful. In the last year under the capable leadership of Mr Pissierssens in Paris, 7 countries participating in ODINEA have each been provided with powerful personal computers for data processing. We now have the pleasure of welcoming you to the next training session in Cape Town, again, wholly funded by UNESCO. We are grateful for this generous financial support and wish also to thank the ODINEA lecturers from Europe, the USA and Australia for support in terms of their time.

I would like to pay thanks to members of my staff involved in the organisation of this important workshop and see the time they have devoted as a contribution by Sea Fisheries / Marine and Coastal Resources towards the celebration of this, the International Year of the Ocean. I hope that your time in Cape Town will be made memorable by the traditional hospitality of the locals and the new data acquisition and analysis techniques you learn over the next two weeks.

2. MR PETER PISSIERSSENS, IOC PROGRAMME SPECIALIST

Dr Mayekiso, Chief Director, ladies and gentlemen,

It is a great pleasure for me to meet you all here in Capetown today. For many of us this is a second opportunity to meet. Indeed, it was exactly one year ago that we met in Mombasa, Kenya for the first ODINEA training course. At that time the ODINEA funding was, to some extent, still a pie in the sky. Today however, we know that we have nearly US$ 750,000 funding for at least 3 years ie 1998-2000, provided by the Government of Flanders, Kingdom of Belgium, SAREC of Sweden , and the IOC.

Between 18 and 24 July, Mozambique hosted the Pan African Conference on Sustainable Integrated Coastal Management (PACSICOM). During this one week a Mnisterial Conference, as well as several Technical Workshops were held. The Conference was convened as part of the region-wide efforts to give greater impetus to the management of seas and coasts in Africa. It brought together ministers and senior officials from all over Africa, as well as from international organizations, NGOs and bilateral donor agencies. The main outcome of the Conference was the adoption of the PACSICOM statement as well as the Maputo Declaration, all aimed at moving the protection, management and development of Africa's marine and coastal environment from the margins to the centre stage of decision and policy making. In terms of follow-up it was decided to organize a conference focusing on conventions, protocols and action plans, which is being held here in Capetown this week, as well as a partnership conference involving donors, to be held in 1999.

Looking at the specific recommendations by the technical workshops which preceded the Conference I wish to draw your attention to the following and I quote:

'2. Provision of a sound information base for local and regional planning requires:

(a) formation of an Africa-wide network of national ocean data centres;
(b) upgrading and expanding the present African network of stations for monitoring of stations for monitoring sea-level rise;
(c) creating a network of specialists trained in the use of data acquired by remote sensing from space satellites;
(d) facilitating the further implementation of modern electronic communication systems such as Internet connections and data transfer mechanisms.

…'

These recommendations have provided ODINEA and ODINAFRICA with a clear mandate. A mandate given by the Ministers participating in the Conference. If we look closer at these recommendations then think it is quite astonishing and rewarding to see that ODINEA and ODINAFRICA's objectives and activities are well in sync with the recommendations: RECOSCIX-WIO developed a network of marine science institutions in the Western Indian Ocean region, ODINEA is now developing a network of data centres. ODINEA is also providing support to national institutions to facilitate their access to the Internet. I think it is therefore fair to say that we are most certainly going in the right direction and the PACSICOM recommendations are there to demonstrate this.

However, of we, as data managers, want these recommendations to be more than words on a piece of paper then we need to ensure the full implementation and sustainability of ODINEA, not only during the first phase of the project for which funding has been secured, but also further beyond. The project will need considerable in-kind support from your institutions and from you. Especially during the early years, a project will depend almost entirely on the drive and enthusiasm of only a few people. For ODINEA, you are these people. The Intergovernmental Oceanographic Commission of UNESCO will continue its support, and will continue seeking support from donors to ensure the long-term future of ODINEA, as we have done for RECOSCIX-WIO. However, we are only facilitators: you are the mothers and fathers of RECOSCIX, ODINEA and ODINAFRICA.

During the next 2 weeks there will be a lot of technical work, a lot of applications to try out, a lot of data to process. However, I also want you to use this workshop as a 'think tank' where the future of ODINEA will be decided. This will allow us at the IOC to tell the donors what YOU need and not what we THINK you need. Partnership is the crucial keyword: partnerships between the institutions in the region, partnerships between the region and the IOC, partnerships between the IOC, the region and donors.

Last, but not least, I wish to say a few words about South Africa. This is my first visit to South Africa and even after a few days I am most impressed by the beauty of the country and about the friendliness and hospitality of the people of South Africa. South Africa is an important country on this continent. Not only has it taken a brave and rare course of political and social transformation which gives us all a new hope in mankind, but it also forms an important linkage between two oceans and two parts of Africa. Whereas South Africa was not a partner in RECOSCIX in the past we are looking forward to your active participation in RECOSCIX-WIO, RECOSCIX-CEA, ODINEA and ODINAFRICA. As for myself I hope that this was a first of many visits to your country.

ANNEX IV

Index of Programs, Databases, and Documents for Marine Data Management Training Workshop in Capetown, South Africa (ODINEA CD-ROM) *December 1998*

OceanPC 2000	In 1992, the Intergovernmental Oceanographic Commission (IOC) began distribution and training with DOS-based **OceanPC Version 1.0**, an integrated collection of software programs. Since that time, the publication of new databases and new programs (mainly Windows applications) has prompted the IOC to begin a major upgrade to OceanPC. The IOC has developed a new schematic for the overall management of marine hydrographic data, **OceanPC 2000**, that integrates many of these new products. This new approach is based on the identification of "pathways" of data flow among a loosely integrated group of essential management and analysis programs. Some parts of OceanPC 2000 are still DOS programs, while others are experimental Windows modules. Other elements are quite sophisticated Windows applications of great utility. CURRENT WORKSHOP SCHEDULE

SOFTWARE PROGRAMS: The section below contains a collection of useful programs for the marine database manager. Many of these programs will be used in the class exercises, but others are provided for your at-home use only. All will be briefly described during the course. Several of these programs are "Test Versions" that are disabled (they do not have full capability) or they should be purchased after a trial period. The IOC urges you to follow the publishers' instructions. Most of these programs can be "run" from the Internet Explorer (by clicking on the controls below. **BUT** this may place a heavy strain on your computer memory. If you have problems, then run the programs directly from Windows, without Internet Explorer.

INITIAL INSTALLATIONS: The programs below will all be described and explained during the training session. Because this document is in HTML format, it is assumed that you already have a browser program installed. The following programs must be installed BEFORE you explore the programs and databases below:
WORDVIEW: Install only if you do not have Microsoft Word
EXCELVIEW: Install only if you do not have Microsoft Excel
ACROBAT
WINZIP: Install only if your current version is older than 6.3
In your Windows Explorer/View/Options/Filetypes menu, make sure that the filename extension ***.TXT*** is associated with **WORDPAD**.

3Dem60	INSTALL RUN REMOVE: Delete the directory ***C:\3DEM60***	A visualization and animation program that can accept the GTOPO30 topographic database format (****.DEM***) files. 3Dem60 can also be used to visualize any binary raster datafile, if you know the characteristics of the file. Once the screen graphic has been constructed, you can continue to create 3-dimensional views and MPEG animations. MANUAL
Access 97	Must be on your computer. No substitute "viewer" program is available.	Access is one of the most powerful relational database management programs available for the PC today. Due to its enormous flexibility and capability, it is desirable to find ways to import OceanPC data (or any marine data) in its table structures. A method has been developed, outlined below, that inputs EXCEL spreadsheet data, and then uses a special ANALYSIS function in ACCESS to break the single large table into related tables of cruises, stations, and sample measurements. IMPORTING SPREADSHEET DATA TO CREATE A RELATIONAL DATABASE
Acrobat 3.0	INSTALL RUN: Should open automatically with all files with ***.PDF*** extension. If needed, the user can create a new shortcut to ***ACRORD32.EXE*** to run this program directly. REMOVE: Should be removed with the Windows Install/Uninstall function.	This program reads text and graphics files with the extension PDF, commonly used to send documents over the Web. The PDF format is becoming an international standard for document-sharing between different systems. This program only reads the PDF files; a separate program that is not free is required to create the PDF files. Acrobat 3.01 is also on the CD (along with a special OCX plug-in that should be installed with it) in the ***CD_PROGS\ACROBAT*** directory.

ArcExplorer 1.1	INSTALL: Make sure that the program is installed in the directory ***C:\ARCEXPLO***. RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	ArcExplorer is the new public-domain Web and local viewer software for some of the files formats used in the ArcInfo and ArcView systems. This program cannot create new data, but it is a very powerful dataset viewer for information that is in GIS formats. MANUAL HELP TUTORIAL
BODC Current Meter Inventory	INSTALL: Not necessary, but ZIP and self-unzipping EXE files available in the ***CD_PROGS\BODC_CMI*** directory of the CD-ROM RUN REMOVE: If installed on C: drive, only necessary to delete the ***C:\ODC_CMI*** directory.	This is the global inventory of current meter moorings, compiled by the British Oceanographic Data Center. It was published in 1992, so many newer moorings are not included, especially WOCE moorings. OVERVIEW
CuteFTP 1.4 (Beta 7)	INSTALL File ***CTL3DV.DLL*** must be copied from ***C:\CUTEFTP*** directory to ***WINDOWS\SYSTEM*** directory for this program to run correctly. RUN REMOVE: Delete ***C:\CUTEFTP*** directory	Well documented FTP program for use in transferring 1 or more files through standard FTP protocols. Very easy to use, even with "fire walls."

Difent 1.8	INSTALL RUN REMOVE: Delete ***C:\DIFENT*** directory.	There are several major systems that have been developed to create and manage environmental metadata ("data about data"). The U.S. NASA has developed the Data Interchange Format (DIF) and its related software, and it has been adopted by several international organizations, including the data-cataloging program of UNEP. This program allow complete data entry and search capability, and the resulting DIF records can be easily converted to other major formats. [A Borland relational database system is included, but it is not a stand-alone function.] OVERVIEW HELP
ExcelView (July 25, 1998 Version)	INSTALL RUN: Should open automatically with any filename that ends in ***.XLS*** or ***.CSV***. REMOVE: Should be removed with the Windows Install/Uninstall function.	If the user does not have Microsoft Excel, then this program allows viewing of ***.XLS*** spreadsheets. The spreadsheets cannot, however, be modified. Do not install this program if you have EXCEL. OVERVIEW
Field	INSTALL RUN	

GLOSS 2.1	INSTALL: Not necessary, but a self-unzipping EXE file is available in the ***CD_PROGS\GLOSS*** directory of the CD-ROM RUN REMOVE: If installed on C: drive, only necessary to delete the GLOSS directory.	The Global Ocean Sea-Level System (GLOSS) is an international cooperation, organized by the IOC. This metadata catalog of participating sites was provided by the British Oceanographic Data Center. A CD version that includes some of the actual sea level data time series is also available. OVERVIEW
Gzip	INSTALL RUN: Run from DOS with command line arguments.	GZIP is a DOS zip/unzip program that is widely used with UNIX files. All of its functions are now available in WinZip 6.3. MANUAL
HDF Browser 1.3	INSTALL: When you are asked where to install the program, supply ***C:\HDFBROWS*** as the destination directory. RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	The popularity of Hierarchical Data Files (multi-object files that can contain entire project databases) requires a browse capability. This freeware program lets the user investigate the internal structure of an HDF file, and to view any graphical objects. In addition, when the characteristics of any simple binary file (with or without header) are known, the browser lets the user create a new HDF file, and view the binary data contents in spreadsheet form. OVERVIEW LICENSE SAMPLE NOTES HELP
ImDisp 7.79	INSTALL RUN REMOVE: Delete the directory ***C:\IMDISP***	This program was originally published by NASA's "Planetary Data System" project as a general-purpose binary data viewer. Recent experience with it, however, indicates that serious bugs make it practically useless for most purposes. It is probably only useful for viewing BYTE data (i.e. 8-bit binary data). MANUAL for Version 7.7

Internet Explorer Version 3.0	INSTALL RUN: Should open automatically when you open any filename that ends in ***.HTM*** or ***.HTML***. Create a new shortcut to the executable file for direct run capability. REMOVE: Should be removed with the Windows Install/Uninstall function.	The Internet Explorer is the premier Web browser, because it recognized and runs BAT files and EXE files, just like the file you are viewing right now.
ISIS 3.07	INSTALL RUN REMOVE: Delete the directory ***C:\ISIS***	ISIS is the DOS library cataloging, indexing, and searching system developed by UNESCO. The hierarchical record structure allows multiple field entries under a single record, a necessary function with literature cataloging systems. TUTORIAL

ITIS 2.1 (SR1)	INSTALL: When you are asked where to extract the zipped files, specify ***C:\TEMP***, not the default directory (***c:\windows\temp***). When you are asked where to install the ITIS system, specify ***C:\ITIS***, not the default directory (***c:\programs\temp***). RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	The Integrated Taxonomic Information System is the new global catalog for all animal and plant species, part of the Species 200 Project. For marine data, it will replace the old U.S. NODC Taxonomic Codes. Due to space limitations only the Class Cetacea (whales and dolphins) is provided as a sample dataset at ***CD_DATA\BIOLOGY\CETACEA.BIN***. All other data can be downloaded over the Web from: http://www.itis.usda.gov/itis/index.html OVERVIEW HELP
McAfee 3.1.1	INSTALL RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	Anti-virus software. This is a trial package, with a 30-day limit on use. The IOC urges you to follow the publisher's recommendations.
NASAVIEW 1.2	INSTALL RUN REMOVE: Delete the directory ***C:\NASAVIEW***	This just-released program is a general-purpose viewer/browser for binary data files. Each file to be viewed must be accompanied by a "label" file (****.LBL***) that describes the layout of the data. This program, and the format of the label files, has been developed by NASA's "Planetary Data System." OVERVIEW

Net-CDF to HDF Converter	INSTALL RUN REMOVE: Delete the directory ***C:\CDF2HDF***	Recently the comprehensive net-CDF data format has been included within the even more comprehensive HDF data specification. This utility provides conversion. OVERVIEW
OceanPar	INSTALL RUN REMOVE: Delete the directory ***C:\OCEANPAR***	Extremely clever program to perform lots of standard marine data calculations involving T,S,P etc.
OceanPC 2.0 **+ OPCPlot 8.0** **+ROSIN/ROSEARCH**	INSTALL RUN REMOVE: Delete the directory ***C:\OCEAN_PC***	This is the standard IOC distribution package of DOS programs for the management of ocean station data (principally T,S, nutrients). It includes a metadata system based on the old ROSCOP cruise inventory forms, and the latest version of the OPCPlot mapping program. **[NEW ADDITION: The release now includes functions for importing comma-separated spreadsheet data, and for exporting data to the Ocean Data View software.]** OceanPC MANUAL OPCPlot MANUAL
OceanPC for Windows (ODB1)	INSTALL RUN REMOVE: Delete the ***C:\ODB1*** directory	This package is the incomplete new Windows version of OceanPC, being developed by Dr. Harry Dooley at ICES.

Ocean Data View 4.0.5	INSTALL RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	This new program is the ultimate ocean data browser. It allows the user to perform all sorts of visual analyses of marine data, using the World Ocean Database 98 or using new data that the user can supply. Click here to read an essay on the program's capabilities. OVERVIEW NOTES HELP Water Masses: An excellent essay by Matthias Tomczak on the use of property-property plots to identify water masses, and on the interesting raphics that can be developed. Water Column Stratification: Another essay by Tomczak on the basic physics of stratification, and the types of profiles seen in the ocean for T, S, Pressure, and Sound Velocity.
PCGrads 1.7 (Beta 9)	INSTALL: This is the most advanced DOS version of the program. A Windows version exists, but an XWindows system is also required. Numerous UNIX versions exist. RUN REMOVE: Delete the ***C:\PCGRADS*** directory	GRADS is an enormously powerful data browser and graphical analysis program that is in worldwide use among the meteorological community. It is known to be the graphical engine within many popular Web sites that provide weather data charts. The program uses a robust internal data model (X, Y, Z, T, parameter) and a special command syntax to provide rapid 1-, 2-, and 3-D graphs of data. The user must, however, write a special data description file for each database, containing the "looping sequence" of the data dimensions. OVERVIEW MANUAL

PCShow 1.0	The user can copy the files in ***CD_PROGS/PCSHOW*** to an appropriate directory in C:	This is a DOS application that can be used to view or animate series of ***.HDF*** data files. The IOC training instructors have not tested it. MANUAL
QuickBasic 4.5	INSTALL RUN REMOVE: Delete the ***C:\QB45*** directory	Although clearly not as capable as Visual Basic, this is probably the most popular "workhorse" programming package in the world. All data managers should have some facility with Quick Basic, particularly to write quick, short programs for data conversions. All of the old OceanPC programs and OPCPlot were written in Quick Basic. NOTES: A short essay to orient the new user to Quick Basic. HIT LIST: Listing of all the "key words" in Quick Basic. The user should be very proficient in the use of the first 50 (all the general ones).
RosWin 1.0	INSTALL RUN REMOVE: Delete the ***C:\ROSWIN*** directory	The older ROSIN routines in OceanPC are DOS-based, and not very easy to use. This is the experimental replacement for these programs.

Sea Level Programs	INSTALL RUN REMOVE: Delete the ***C:\SLPR2*** directory	This is Version 2 of the programs written at the Sea Level Center at the University of Hawaii. The programs work on the datafiles contained in the WOCE-BODC-UHSLC CD-ROM, but only after the data have been converted to a new format. You can perform this conversion with the program ***CD_PROGS\SEALEVEL\JSLAPH.EXE.*** You will need to copy this file to your hard drive and perform the work there. OVERVIEW MANUAL
SelTopo	INSTALL RUN REMOVE: Delete the ***C:\SELTOPO*** directory	This program extracts ASCIII or binary datasets for any given rectangle on the globe, from the file ***ETOPO5.DOS*** . An extracted ASCII file has a header that explains the structure of the grid. An extracted binary file is described in the accompanying format information. When using the program the geographic limits are entered by you given as signed whole numbers (i.e. no decimals) separated by commas. The result is found in the directory ***C:\SELTOPO*****. NOTE: the binary extraction function does not work in this version of the program, due to a bug.**

SURFER 6.0	INSTALL: A demonstration version of the commercial software, this program does not allow printing or saving the screen graphics. The IOC recommends that the user purchase the complete package. RUN REMOVE: Delete the C:\SURFER6 directory and remove the following two lines from your ***WIN.INI*** file: ***[Surfer]*** ***SURFER6_16=C:\SURFER6***	This program is the world standard for PC gridding and contouring of data. The user can export ASCII gridded files that can be used in OPCPlot to create and save screen graphics. OVERVIEW TUTORIAL HELP
TransPro 1.1	INSTALL: Specify the folder name ***TRANSPRO*** for the installation site. RUN	TransPro is a utility that "decodes" some email formats, expecially attachments to messages. After installation, the following files will give useful information: OVERVIEW NOTES
ViewPro 4.2	INSTALL: Specify the folder name ***VIEWPRO*** for the installation site. RUN	This program is an all-purpose graphics editor that the publisher has recently placed completely in the public domain. Although no manual is provided, with a little practice, it should be easy to use. It recognizes a large number of graphics file formats. Unfortunately, after 30 days the program is unable to edit GIF files unless you upgrade to a licensed version.

VMPEG 1.7 (Lite)	INSTALL: Specify the folder name ***VMPEG*** for the installation site. It is NOT necessary to install the WinG system to view the graphics if you are working in Windows95. Read the HELP file before installing.	This program provides and MPEG visualization capability for Windows95. Check with your system administrator before installing, as you may already have this ability on your present machine. HELP
WebReaper 3.4b	INSTALL: Specify the folder name ***WEBREAP*** for the installation site. RUN: Usually begins with a minimized icon along the bottom of the screen. REMOVE: Should be removed with the Windows Install/Uninstall function.	This program is an "offline browser" that can be used to download an entire Website to your hard disk. The hypertext (***.HTML*** or ***.HTM***) documents that are retrieved can be automatically edited so that the references between them are correct for your local configuration. The size, number, and relationships among the downloaded files can be pre-selected by you before you begin downloading the site. Extreme care should be exercised, as some sites can be extremely large after only a few "levels" of documents are specified. OVERVIEW HELP
WinZip 6.3 (SR1)	INSTALL: This is a demonstration version. The IOC recommends that the user should buy the complete commercial package at the end of the trial period. RUN REMOVE: Should be removed with the Windows Install/Uninstall function.	The premier 32-bit Windows zip and unzip program. Has extremely good ***HELP*** files. Was used extensively in the preparation of this CD.

World Ocean Database Utility Programs	INSTALLATION & RUNNING: These programs should be copied to your hard disk and used there with unzipped versions of the various datafiles from the CD.	WOD98 CONVERSION PROGRAMS
WordView	INSTALL RUN: Should open automatically with any filename that ends in DOC (all Microsoft Word files).	If the user does not have Microsoft Word, then this program allows viewing of DOC files. The documents cannot, however, be modified. OVERVIEW
DATABASES....		
Biology:Species Catalog	The Integrated Species Information System (ITIS) can be populated by datafiles that are available on the Web at http://www.itis.usda.gov/itis/index.html. Due to space limitations, only a single example file (***CD_DATA\BIOLOGY\CETACEA.BIN***) is provided here for use with the ITIS software. This file should be indicated when ITIS asked the user which file to open.	
Earth:BathyTopo:Etopo5	The ETOPO5 is a global elevation file, at a resolution of 5 minutes, produced by the U.S. National Geophysical Data Center. It is the datafile used by SELTOPO. DOCUMENTATION	
Earth:BathyTopo:GTOPO30	The GTOPO30 data series is a new product from the US Geological Survey (USGS), consisting of 30-second resolution topography (land only) of the earth. The datafiles (****.DEM***) cover individual "tiles" about 35° by 40°. These data can be viewed with the 3DEM60 software (see above). In the directory ***CD_DATA\EARTH\BATHYTOPO\GTOPO30*** you will find folders for the tiles E020N40 and E020S10, covering eastern Africa. A view of the entire earth, with elevations coded by color, is available here. METADATA FORMAT DOCUMENTATION	
Earth:BathyTopo:GEBCO	The following depth contours (as vector data, NOT a gridded bathymetry) can be found in the directory ***CD_DATA\EARTH\BathTopo\GEBCO*** (all in the special GEBCO ASCII export format that can be read by OPCPlot): 100m, 200m, 500m, 1000m, 2000m, 3000m, 4000m, 5000m, and 6000m	

Earth:BathyTopo:TerrainBase	The TerrainBase project was designed to provide a global, 5-minute bathymetry and topography. On the workshop CD, in directory ***CD_DATA\EARTH\BATHYTOPO\TERRAINBASE*** you will find folders with data for Africa, Madagascar, and the entire Globe. These data are binary, with ancillary information files required by the Geovu program (not included with this CD).
Earth:Coasts:GEBCO	A 1:250,000 coastline for all E Africa and the W Indian Ocean can be found in the directory ***CD_DATA\EARTH\Coasts\GEBCO***. It is in the special GEBCO ASCII export format that can be read by OPCPlot.
Formats:GETADE	DOCUMENTATION GUIDELINES
Formats:GF3	The information provided here covers only hydrocast data (i.e. standard bottle sampling). OVERVIEW DOCUMENTION
Formats:HDF	A series of PDF documents (to be read with Acrobat) is available to explain the complicated HDF architecture. They are located in ***CD_DATA\FORMATS\HDF*** of the training CD**.** Their sequence is explained in an overview document.
Formats:ICES:Profile	DOCUMENTATION
Formats:NODC:All	LIST OF FORMATS
Formats:NODC:P3	DOCUMENTATION: This format, which can be used for hydrocast (bottle) data, replaces P2 which was not widely used.
Formats:NODC:SD2	DOCUMENTATION: Commonly used for exchange of hydrocast data
Formats:Code Tables:IOC	COUNTRY CODES PARAMETER CODES SHIP CODES
Formats:Code Tables:NODC	Not available in digital form.
Hydrography:ICES	OPC3.ICE: Example datafile created by joining the ***OPC1.ICE*** and ***OPC2.ICE*** files in the DATA subdirectory of the OceanPC system. Note that it consists of 2 different cruises. One cruise had many "small" stations, the other cruise had a smaller number of "big" stations.

Hydrography:SD2	LONG TIME SERIES DATA FILE: Taken from NODC's ***CD No. 20***, this datafile contains many years of hydrographic cast data from Ocean Weather Station A, in ***.SD2*** format. This file is an excellent example for conversion (through the OceanPC system) to the ATLAST format. In ATLAST very beautiful time-series plots can be created, showing long-term changes in salinty and temperature in the North Atlantic. [NOTE: This conversion takes several steps, and is not simple; it is a very good exercise in file conversion techniques, however.] OVERVIEW LIST OF SITES/CRUISES ON CD 20
Hydrography:WOD98	Released in early 1998, the World Ocean Database 1998 replaces the World Ocean Atlas 1994. This enormous archive (5 CDs) contains the world's largest collection of hydrographic data, divided into source- and datatype-bins. The files are gzipped, so they must be unpacked with GZIP. Otherwise, the program Ocean Data View automatically unpacks the files as it loads them into an internal data collection. OVERVIEW MANUAL
Mapping:GIS files for Africa	A wide range of datafiles (in the ArcInfo "shapefile" format) are available for the African continent in the directory ***CD_DATA\MAPPING\AFRICA***. They can be displayed with the ArcExplorer program (see above), using the Add Theme function.
Mapping:Oceanic Themes	The directory ***CD_DATA\MAPPING\MRJ_SAMP\WORLD*** contains many folders with ArcExplorer-compatible files of global ocean themes. These files can also be displayed with ArcExplorer.
Metadata:General Overview	This is an essay on the status of metadata cataloging of environmental information. It has many links to important Web sites around the world. ESSAY
Metadata:Example	The Kenya National Oceanographic Data Center has developed this prototype indexing system in Access. It has many similarities with the DIFENT software. KeNODC DIRECTORY
Metadata:ROSCOP	The "Report of Observations/Samples Collected on an Oceanographic Platform" (ROSCOP) is one of the oldest environmental metadata formats in the world. ROSCOP forms were formerly filled out for every cruise, manually, and there are about 30,000 of them at ICES and/or the U.S. NODC. Nowadays they are created digitally with the ROSIN software.

Satellite Data:Mixed Datasets:Earth Observing System Data and Information System (EOSDIS) Data Sampler	A self-contained sampler of many different types of satellite data available from NASA Distributed Active Archive Centers (DAACs). Run the program ***RUNA4W32.EXE*** on the CD, then open the file ***EOS1297.A4R***.
Satellite Data:Mixed Datasets:TOGA CDs	The Tropical Oceans-Global Atmospheres (TOGA) Program dataset is a set of 6 CDs covering the period 1985-1990, including a wide variety of datasets related to the program's interest area between 40S and 40N latitudes (although some files are global). Included here are some of the files that represent climatologies, rather than the individual monthly or weekly data from the entire 6-year period: Climate Analysis Center (CAC) Sea Surface Temperature (SST): Monthly global SST maps. Can be converted to OPCPlot format with X2OPC and plotted with OPCPlot. Florida State University Pseudo Wind Vectors: Monthly vectors for the tropical Indian Ocean. Can be converted to OPCPlot format with X2OPC and plotted with OPCPlot. Global Precipitation Climatology Program (GPCP): Global maps for 5-day periods in 1986 only. Can be converted to OPCPlot format with X2OPC and plotted with OPCPlot. International Satellite Cloud Climatology Project (ISCCP): A single example file in GRIB format contains all cloud coverage data for 1985. National Center for Atmospheric Research (NCAR): Climatological data for February and August, only. Includes global maps of solar radiation flux, long wave flux, latent heat flux, sensible heat flux, U component of the wind, V component of the wind, and sea surface temperature. Can be converted to OPCPlot format with X2OPC and plotted with OPCPlot. SHORT MANUAL EXTENDED MANUAL W/ FORMAT DESCRIPTIONS

Satellite Data:Mixed Datasets:Coastal Zone Color Scanner (CZCS) Chlorophyll & Advanced Very High Resolution Radiometer (AVHRR) Multi-Channel Sea Surface Temperature (MCSST) **PODAAC Catalog No. 15**	This collection of mixed data was created as a true climatology, because the data are monthly averages and the coverage is global for both datasets. The format of the data is ***.HDF*** format (although the filename extension is not ***.HDF***), so the images can be viewed with the HDF Browser program. Because the files are only BYTE binary, the special viewing program IMDISP can also be used. Only the months of February and August are provided as examples. The climatologies are for chlorophyll, and daytime and nighttime sea surface temperatures. The original CDs also include maps showing the numbers of observations on which these climatologies are based. Note that the extraction software on the CD has been replaced by updated version available over the Internet at ftp://podaac.jpl.nasa.gov in the pub/pigment_conc directory. Also the formula to convert the digital data numbers (DN) to pigment concentration should read: Concentration (mg/m**3) = 10 EXP (0.012*DN - 1.4) MANUAL
Satellite Data:Mixed Datasets:WOCE Topex/Poseidon Sea Surface Height (1992-97) and AVHRR Sea Surface Temperature (1990-96) **PODAAC Catalog No. 100**	These data cover nearly coincident time periods, but the temperature files consist of 5-day averages and the sea surface height files consist of 10-day averages. Each data file is binary, with a readable ASCII header, but the binary part contains both the averaged measurements of interest and a second part that shows "counts" of data used in the averaging process. It is possible to view the first part of each data file with a binary file viewer/browser. The example files in the directory ***CD_DATA\SATDATA\WOCE\TOPEXPOSEIDON*** include ***.GIF*** browse images. OVERVIEW AVHRR FORMAT ALTIMETER FORMAT

Satellite Data:Pathfinder:Sea Surface Temperature 1991 & 1992 **PODAAC Catalog No. 67**	The Pathfinder CDs are annual volumes of the best sea surface temperature data for each month. The images are in ***.HDF*** format, including matrices showing the number of observations on which the climatologies are based. The images can only be viewed with the HDF Browser. The data are provided at various resolutions: 9 km per pixel, 18 km per pixel, and 54 km per pixel, as well as ***.GIF*** format "browse" images which are extremely low resolution. A single month (in this case January 1991) is shown in all resolutions (ascending and descending satellite trajectoris) for comparison. FORMAT OVERVIEW MANUAL
Satellite Data:WOCE:Mean Surface Wind Fields from the ERS-AMI (ERS-1 & ERS-2) and ADEOS-NSCAT Microwave Scatterometers	This recently released CD contains weekly data for the period 1991 to 1998, and monthly climatological data. The data are contained in ***.GIF*** image files, but software (which must be run from your hard drive) is included to convert the 8-bit image data to physical units files (ASCII or binary). The format of the CD is an extremely tightly organized, HTML-based document that would be impractical to subset to a teaching CD. You should work directly from the CD itself. MANUAL: Available on the CD in multi-file, HTML format.
Satellite Data:WOCE:Mean Surface Wind Fields:DMSP-SSM/I and ADEOS-NSCAT, Vols. 1 & 2 **PODAAC Catalog No. 100**	A recent contribution from the WOCE program. These data are mainly binary, with ASCII headers to explain the content. OVERVIEW NSCAT FORMAT SSMI FORMAT
Sea Level Data:WOCE:Global Data 1.0 (February 1998)	This CD of sea level data consists of many different formats and types of information. If you have installed the University of Hawii sea level software, the hourly data in the Research Quality Data directory can be converted with the program ***C:\SLPR2\DIN\JSLAPH.EXE*** to the format needed by the analysis programs. OVERVIEW OF CD DATA TYPES ON CD RESEARCH QUALITY DATA HOUR FORMAT DAY FORMAT MONTH FORMAT EXAMPLE HOUR DATA EXAMPLE DAY DATA EXAMPLE MONTH DATA [If you unzip the Example Hour Data, then unzip it to ***C:\SLPR2\DIN*** where the subsequent conversion software is located.]
MARINE DATA MANAGEMENT....	
Hydrography:Quality Control	GODAR/NODC MANUAL
International Programs:IOC:History	DOCUMENT
International Programs:IOC:Pubs	GENERAL CATALOG SEA LEVEL MANUAL 1 SEA LEVEL MANUAL 2
International Programs:IODE	DOCUMENT

ANNEX V

LIST OF ACRONYMS

AODC	Australian Oceanographic Data Centre
CD-ROM	Compact Disc with a Read-Only Memory
CSIR	Council for Scientific and Industrial Research, South Africa
DNA	Designated National Agency
GLOSS	Global Sea-Level Observing System
ICAM	Integrated Coastal Area Management
IIP	Instituto de Investigaçao Pesqueira, Mozambique
INAHINA	Instituto Nacional de Hidrografia e Navegação, Mozambique
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCINCWIO	IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean
IODE	International Oceanographic Data and Information Exchange/IOC Committee
MEDI	Marine Environmental Data Information Referral System/IOC
NASA	US National Aeronautics and Space Administration
NODC	National Oceanographic Data Centre
ODINAFRICA	Ocean Data and Information Network for Africa/IODE
ODINEA	Ocean Data and Information Network for Eastern Africa/IODE
ODV	Ocean Data View
OODBMS	Object Oriented Database Management Systems
ORDBMS	Object Relational Database Management Systems
PACSICOM	Pan African Conference on Sustainable Integrated Coastal Management
RDBMS	Relational Database Management Systems
RECOSCIX-CEA	Regional Co-operation in Scientific Information Exchange in the Central Eastern Atlantic/IOCEA
RECOSCIX-WIO	Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean
SADCO	South African Data Centre for Oceanography
SeaWIFS	Sea-Viewing, Wide-Field-of-View Sensor/NASA
SFRI	Sea Fisheries Research Institute, South Africa
Sida	Swedish International Development Authority
TAO	Tropical Atmosphere Ocean
UNESCO	United Nations Educational, Scientific and Cultural Organization
WOD	World Ocean Database
WWW	World Wide Web

[end]

ANNEX VI

GROUP PHOTOGRAPH

From left to right, front row:
Peter Pissierssens, Veronica Dove, Olivio Sitoe, Kreshnaduth Googoolye, Christopher Muhando, Harrison Ong'anda, Rondolph Payet, Sabelo Gumede,
From left to right, back row:
Marcel Van Den Berg, Clive Angwenyi, Geoff Bailey, Murray Brown, Greg Reed, Desiderius Masalu, Mika Odido.